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REMARKS

Claims 1 through 24 are currently pending in the application.

This amendment is in response to the final Office Action of January 21, 2004 and the Advisory Action of March 31, 2004.

Information Disclosure Statement(s)

Applicants have attached a copy of the Information Disclosure Statement filed on July 17, 2002 along with a copy of the return receipt date-stamped postcard. Applicants respectfully request that the information cited on the PTO-1449 be made of record herein.

35 U.S.C. § 112 Claim Rejections

Claims 1 through 24 are rejected under 35 U.S.C. § 112, first paragraph, as based on a disclosure which is not enabling. In particular, the Office Action states that "[t]he compositions and properties of the first and second adhesive layers are critical or essential to the practice of the invention, but not included in the claim(s) is [sic] not enabled by the disclosure...."

Applicants assert that the term "adhesive" in the first and second adhesive layers is sufficient to enable one skilled in the art of semiconductor manufacturing to make and use the invention. The term "adhesive," which is included in the claims in relation to the first and second adhesive layers, inherently includes the properties that are critical and essential to the practice of the invention. In other words, it is essential that the first and second adhesive layers be capable of adhering a tape or flexible film material to an additional tape or flexible film material or to the surface of a semiconductor. These adhesive properties, suitable for use in carrier-tape or marking-tape applications, are well known and commonly used by persons skilled in the art of semiconductor manufacturing.

It is also recited in the claims that the first adhesive layer must also comprise electro-magnetic radiation-curable components. Such radiation-curable components inherently provide certain properties to the first adhesive layer that are essential to the invention and are well known in the art.

Applicants assert that no other properties of the first and second adhesive layers are critical or essential to the practice of the invention and need not be recited in the claims to satisfy the enablement requirement.

Applicants assert that the specific *compositions* of the first and second adhesive layers are not critical to the invention, as various compositions, many of which are recited in the specification, can provide the critical and essential *properties*. These compositions are well known in the art of adhesives and are intended to be within the scope of Claims 1 through 24.

Applicants clearly state in paragraph [0039] that "[l]aser markable tape 1 preferably has an adhesive layer 2 formed on at least one side thereof, allowing laser-markable tape 1 to be temporarily or permanently adhered to a surface on the backside 12 of semiconductor wafer 10.... Adhesive layer 2 may comprise a pressure-sensitive adhesive, radiation-curable adhesive, B-stage epoxy, or any other adhesive variety known in the art with bonding strength and other characteristics consistent with the type of tape used for the purposes of the invention. For example, in applications where semiconductor die 20 is to be marked by ablation of one or more layers of marking tape 1 with a laser, an adhesive layer with permanent adherence to the die surface may be used for which various epoxy resins or other adhesives known in the art will prove suitable.... Laser-markable adhesive layers which are contemplated for use in the present invention include, but are not limited to, UV acrylics, thiolene, poly-paraxylylene (Paralene), urethanes, silicones, epoxies, and acrylics.

Applicants assert that these teachings are enabling to persons skilled in the art. A person skilled in the art would not have to engage in "undue experimentation" because the teachings cited above give the skilled artisan "sufficient direction or guidance." In re Colianni, 561 F.2d 220, 224, 195 USPQ 150, 153 (CCPA 1977). A simple internet search for "radiation curable adhesive" will provide numerous links to articles discussing these types of adhesives and companies who commercially supply such adhesives. Applicants also assert that there is a reasonable correlation between the scope of the enablement of the disclosure and the scope of the claims. The disclosure cited above expressly recites the critical and essential properties of the first and second adhesive layers, and then teaches various examples of materials from broad

categories of adhesives which can provide those properties.

The rejection of Claims 5, 13, and 21 under 35 U.S.C. 112, first paragraph, as set forth in Section 7 of the Office Action of October 8, 2003 has been maintained. Applicants have amended Claims 5, 13, and 21 and respectfully assert that the specification enables a person skilled in the art to make and use the invention commensurate in scope with these amended claims.

Applicants state in paragraph [0018] of the as-filed application that "[t]he apparatus comprises a tape which makes use of a multi-level adhesive that includes an outermost layer formed of a mixture of electro-magnetic radiation-curing components and adhesive. After application to a bare semiconductor die and exposure to an electro-magnetic radiation source, the mixture layer cures and bonds to the die surface, rendering a homogenous surface suitable for laser marking."

In paragraph [0044] of the as-filed application it is stated that "[c]arrier tape 4 or an adhesive layer thereof may also be formed to be relatively weakly adhesive to marking tape 1, or multilevel variation thereof, allowing for easy removal of the carrier tape prior to, after, or during the laser marking of semiconductor die 20. In a preferred embodiment, the adhesive layer of the carrier tape is UV- (or electro-magnetic radiation) sensitive such that upon exposure to UV light (or electromagnetic radiation), the adhesive properties of carrier tape 4 are reduced, and carrier tape 4 may be easily peeled away or removed from marking tape 1. One such carrier tape and adhesive combination suitable for purposes of the invention comprises a UV-penetrable polyvinyl chloride tape with an acrylic UV-sensitive adhesive."

Additionally, in paragraphs [0048] and [0049] of the as-filed application it is stated that "[i]n another preferred embodiment, carrier tape 4 can be used in conjunction with one or more levels of adhesives, at least one of the adhesives comprising laser-markable components when disposed on a surface of a bare semiconductor die 20. In one embodiment, a markable adhesive layer 2B serves to bind carrier tape 4 to a bare surface on the backside 12 of semiconductor wafer 10, and will transfer a laser-markable residue to a surface of semiconductor die 20 when carrier tape 4 is later removed. In this case, carrier tape 4 functions to provide a support and protective

function during semiconductor processing, but can be peeled away to effect transfer of the laser-markable residue.

In a second related example, a carrier tape 4 with a multilayer adhesive can be used wherein a first layer of the multilayer adhesive comprises a mixture of electromagnetic radiation-curing components and an adhesive. The first mixture layer is formed of a type so as to cure and bond to a surface of a bare semiconductor die 20 upon exposure to a radiation source, whereupon it is laser markable. A second adhesive layer can be provided over the first mixture layer, the second adhesive layer providing adherence to both the first mixture layer and carrier tape 4. The second adhesive layer may also be formed to be electromagnetic radiation-curable and adhere to the first mixture layer and carrier tape 4 in an uncured state. Upon exposure to radiation, the second adhesive layer can either cure onto the first mixture layer or, alternatively, lose its adhesive properties and facilitate peeling of carrier tape 4 from a wafer or surface of a bare semiconductor die 20."

Applicants assert that the teachings found in the above cited paragraphs, when taken together, provide sufficient guidance and direction such that one skilled in the art of adhesives could make and use the invention without undue experimentation. Therefore, the claimed invention as recited in amended Claims 5, 13, and 21 are enabled by the specification and are allowable under 35 U.S.C. § 112, first paragraph.

The Office Action states that "in Claim 1, the lacking of a suitable composition and properties of the "second adhesive" renders the instantly claimed invention unduly broad and in excess of provided enablement, e.g., the 'second adhesive' could encompass the 'first outermost adhesive,' and forms one single layer."

Applicants respectfully assert that Claim 1 is directed to a laser-markable tape comprising "a multilayer adhesive." Applicants assert that only tapes comprising multilayer adhesives are included within the scope of the claims, and that Claim 1 is not unduly broad or in excess of provided enablement.

Claims 5, 13 and 21 stand rejected under 35 U.S.C. § 112, first paragraph, as filing to comply with the written description requirement. According to the Office Action, "[t]he claims contain subject matter which was not described in the specification in such a way as to

reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention...."

In particular, Claims 5, 13, and 21 were rejected in the Office Action dated October 8, 2003 (Paper No. 0926) under 35 U.S.C. § 112, first paragraph for two reasons: (1) "because the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above" (the Examiner is apparently referring to the arguments set forth in the rejection made under 35 U.S.C. § 101 in Section 4 of the Office Action dated October 8, 2003); and (2) because "one skilled in the art clearly would not know how to use the claimed invention." It appears from the Office Action dated January 21, 2004 (Paper No. 123103) that the rejection of Claims 5, 13, and 21 under 35 U.S.C. § 101 for lack of utility has been withdrawn, and that the corresponding rejection of these claims under 35 U.S.C. § 112, first paragraph for lack of utility has been maintained, since the Office Action has maintained the argument that both arguments for rejection under 35 U.S.C. § 112k, first paragraph. Applicants request clarification as to whether the Examiner has rejected Claims 5, 13, and 21 under 35 U.S.C. § 112, first paragraph, because the invention does not have utility, or because one skilled in the art will not know how to use the invention, or both. Applicants respectfully submit that "[a] 35 U.S.C. § 112, first paragraph, rejection [because the invention lacks utility] should not be imposed or maintained unless an appropriate basis exists for imposing a rejection under 35 U.S.C. 101." MPEP § 2164.07(I)(A). Since the rejection under 35 U.S.C. § 101 has been withdrawn, the Applicants have inferred that the Office Action has maintained a rejection of claims 5, 13, and 21 under 35 U.S.C. 112, first paragraph, not because the claimed invention does not have utility, but rather because one skilled in the art would not know how to use the claimed invention. MPEP § 2164.07(II).

Applicants have amended Claims 5, 13, and 21 and assert that the claims in their amended form comply with 35 U.S.C. § 112, first paragraph, and satisfy the written description requirement, are commensurate in scope with the written description, and contain no new matter. In particular, the recitation "curing said first outermost adhesive layer results in a loss of adhesion between said first outermost adhesive layer and said second adhesive layer" has been removed and the Claims revised to be commensurate in scope with the written description. The

Examiner notes that the specification discloses that the "adhesive properties of carrier tape 4 are reduced, ...," and the Claims have been revised to indicate that it is the adhesive properties of the tape which are reduced.

In paragraph [0044] of the as-filed specification it is stated that "[i]n a preferred embodiment, the adhesive layer of the carrier tape is UV-(or electro-magnetic radiation) sensitive such that upon exposure to UV light (or electromagnetic radiation), the adhesive properties of carrier tape 4 are reduced, and carrier tape 4 may be easily peeled away or removed from marking tape 1. One such carrier tape and adhesive combination suitable for purposes of the invention comprises a UV-penetrable polyvinyl chloride tape with an acrylic UV-sensitive adhesive."

Additionally, in paragraph [0049] of the as-filed application it is stated that "a carrier tape 4 with a multilayer adhesive can be used wherein a first layer of the multilayer adhesive comprises a mixture of electromagnetic radiation-curing components and an adhesive. The first mixture layer is formed of a type so as to cure and bond to a surface of a bare semiconductor die 20 upon exposure to a radiation source, whereupon it is laser markable. A second adhesive layer can be provided over the first mixture layer, the second adhesive layer providing adherence to both the first mixture layer and carrier tape 4.... Upon exposure to radiation, the second adhesive layer can either cure onto the first mixture layer or, alternatively, lose its adhesive properties and facilitate peeling of carrier tape 4 from a wafer or surface of a bare semiconductor die 20."

Applicants assert that the specific teachings found in these paragraphs, when taken together with the entire as-filed application, enable any person skilled in the science of adhesives, specifically radiation sensitive adhesives, to use the invention as recited in Amended Claims 5, 13, and 21. The disclosure clearly teaches adhesive layers having radiation-curable components which cure upon exposure to radiation in addition to adhesive layers having radiation-sensitive properties which lose their adhesive properties upon exposure to radiation. In addition, the disclosure clearly teaches multilayer adhesive structures, comprising a layer having a radiation curable layer and a radiation sensitive layer. In such a multilayer adhesive structure is inherently capable of being such that curing the radiation-curable layer will result in the radiation-sensitive

losing its adhesive properties. Applicants respectfully assert that the disclosure, when read as a whole, is commensurate in scope with the Claims as currently amended.

Therefore, Applicants respectfully request that the rejection of Claims 5, 13, and 21 under 35 U.S.C. § 112, first paragraph, be withdrawn and allowed to issue in their amended form.

Claims 1 through 24 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention.

In particular, Claims 5, 13, and 21 are rejected for "merely setting forth physical characteristics desired in article [sic], and not setting forth suitable [a] composition which would meet such characteristics[, and] are invalid as vague, indefinite, and functional since they cover any conceivable combination of ingredients either presently existing or which might be discovered in future and which would impart desired characteristics." The Office Action dated October 8, 2003 (Paper No. 0926), Section 9.

Applicants respectfully assert that the Office Action has applied the wrong test in determining whether the Claims satisfy the requirements of the second paragraph of 35 U.S.C. § 112. Applicants assert that Claims 5, 13, and 21 set forth the subject matter that the applicants regard as their invention and that the claims particularly point out and distinctly define the metes and bounds of the subject matter that will be protected by the patent, if granted. Applicants assert that the scope of the claims would be clear to persons of ordinary skill in the art. Breadth of a claim is not indefiniteness. *In re Miller*, 441 F.2d 689, 169 USPQ 597 (CCPA 1971). Also, Applicants assert that the Claims define the adhesive layers by what they do, rather than by what it is. Functional language does not, in and of itself, render a claim improper. *In re Swinehart*, 439 F.2d 210, 169 USPQ 226 (CCPA 1971); *See also*, *In re Barr*, 444 F.2d 588, 170 USPQ 33 (CCPA 1971).

Applicants assert that the inventions of claims 5, 13, and 21 clearly comply with the provisions of 35 U.S.C. § 112, second paragraph, because Applicants have described the claimed inventions by clearly stating that "a carrier tape 4 with a multilayer adhesive can be used wherein a first layer of the multilayer adhesive comprises a mixture of electromagnetic radiation-curing components and an adhesive", "[t]he first mixture layer is formed of a type so as to cure and

bond to a surface of a bare semiconductor die 20 upon exposure to a radiation source, whereupon it is laser markable", "[a] second adhesive layer can be provided over the first mixture layer, the second adhesive layer providing adherence to both the first mixture layer and carrier tape 4", "[t]he second adhesive layer may also be formed to be electromagnetic radiation-curable and adhere to the first mixture layer and carrier tape 4 in an uncured state", "[u]pon exposure to radiation, the second adhesive layer can either cure onto the first mixture layer or, alternatively, lose its adhesive properties and facilitate peeling of carrier tape 4 from a wafer or surface of a bare semiconductor die 20", "UV-sensitive tape can be formed, for example, of various photo-polymerizable monomers and polymers, photo-initiators, cross-linking agents, and other photo-sensitive agents known in the art", and "[a]dhesive layer 2 may also be chemically solvable by any number of solvents, thermally impacted, or otherwise short-lived in its adhesive properties".

Applicants assert that such descriptions of the adhesive compounds clearly comply with the provisions of 35 U.S.C. § 112, second paragraph, regarding claims 5, 13, and 21. Applicants assert that contrary to the assertion the in Office Action that "these claims merely [are] setting forth physical characteristics . . . and [are] not setting forth [a] suitable composition which would meet such characteristics . . . since they cover any conceivable combination of ingredients either presently existing or which might be discovered in future . . . ", that there are a defined number of known adhesives having such characteristics as set forth in claims 5, 13, and 21, not any conceivable combination of ingredients. Applicants assert that there has been no showing that there are an infinite number of conceivable combination of ingredients having any such characteristics whatsoever. In addition, Applicants assert that the claims are not unduly broad because they do not read upon materials that could not possibly be used with a laser-markable tape for marking a semiconductor device. Absent any showing to the contrary, Applicants assert that the claimed invention complies with the provisions of 35 U.S.C. § 112, second paragraph. Therefore, it is respectfully submitted that Claims 5, 13, and 21 are allowable in their amended form.

In Section 9 of the Office Action dated October 08, 2003, the Office Action stated that the "Applicants have made an apparently simple structure unduly confusing by making many

similar or redundant claims." The Office Action states that independent Claims 1, 9 and 17 "are de facto duplicates with minor variations in the preamble...." Applicants respectfully assert that substantive differences are found in the body of the claims affecting the scope of the subject matter within the claims. In particular, the phrase "the electromagnetic radiation-curable components providing a laser-markable surface upon exposure to an electromagnetic radiation source," which is found in Claim 1, is substantively different that the phrase "...radiation-curable components for providing a mark on a laser-markable surface upon exposure thereof to electromagnetic radiation," which is found in Claim 9. In addition, the phrase "...radiation-curable components for providing a mark on a surface upon exposure thereof to electromagnetic radiation," which is found in Claim 17, is substantively different than the previously cited phrases from Claim 1 and Claim 9. Therefore, Claims 1, 9, and 17 are not redundant or unduly confusing and should be allowed.

Finally, Applicants have amended Claims 2 through 4, 6, 10 through 12, 14, 18 through 20 and 22. Applicants assert that these claims, in there amended form, are not directed to the steps of use and that each dependent claim contains an additional element or limitation in addition to those recited in the independent claims. Therefore, Applicants respectfully submit that Claims 2 through 4, 6, 10 through 12, 14, 18 through 20 and 22 should be allowed in their amended form.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Weng et al. (U.S. Patent 5,972,234)

Claims 1, 7 through 9, 15 through 17, 23 and 24 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Weng et al. (U.S. Patent 5,972,234). Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants further submit that to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or

suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicants' disclosure.

Applicants respectfully assert that there is clearly no suggestion or motivation in Weng et al. to modify the reference such that the tape disclosed therein comprises radiation-curable components to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions. Further, Applicants assert that Weng et al. fails to teach or suggest all the claim limitations of the presently claimed inventions of presently amended independent claims 1, 9, and 17 to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions.

Turning to the cited prior art, Weng et al. teaches or suggests a method for marking a semiconductor surface. Weng et al. teach or suggest that a polymeric tape can be provided that is suitable for ablative photodecomposition. Column 4 lines 25-40. In other words, the mark which is to be formed in the semiconductor surface is first formed as a cavity through the tape using "high-intensity energy beams such as ultraviolet light or laser." Column 4 lines 32-33; *See also* column 2 lines 63-63, column 3 lines 6-11, column 3 lines 22-23, column 3 lines 27-30, column 3 lines 39-40, column 4 lines 52-54. After the mark has been formed *through* the tape, the tape is applied to the semiconductor surface. Column 4 line 57 – column 5 line 7. Finally, the mark is formed in the semiconductor surface by etching the semiconductor in the area exposed by the mark formed in the tape. The tape protects the rest of the semiconductor surface from the etchant, such that the mark in the tape is patterned into the semiconductor surface. Column 5 lines 8-25. Finally, the tape is removed from the surface of the semiconductor, leaving the mark formed by the etchant. Column 5 lines 27 – 37.

Applicants assert that to include radiation-curable components into any adhesive layer formed in the tape disclosed by Weng et al. would render the invention inoperable. Specifically, applying radiation would *cure* the adhesive layer, which would prevent a pattern from being formed through the tape. Therefore, no mark could be formed through the tape by an ablative photodecomposition process if the adhesive layer of the tape were to include radiation-curable components. Applicants respectfully assert that a tape comprising an adhesive layer including

radiation-curable components is not "any suitable tape of polymeric based material, which can be easily patterned by high-intensity energy beams such as ultraviolet light or laser," as suggested by the Examiner.

In addition, because the inclusion of radiation-curable components in any tape or adhesive of the disclosure of Weng et al. would render the device inoperable for the method disclosed therein, there can be no reasonable expectation of success in marking the semiconductor device according to the method disclosed therein. Because Claims 1, 9, and 17 include the limitation of an adhesive layer comprising radiation-curable components, these claims cannot be considered obvious in view of Weng et al. Therefore, Claims dependent therefrom are also not obvious in view of Weng et al.

Applicants assert that Claims 8, 16, and 24 are not obvious in view of Weng et al. since they are dependent from Claims 1, 9, and 17 respectively.

In summary, Applicants assert that Weng et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed inventions of presently amended claims 1, 8, 9, 16, 17, and 24 for the reasons set forth herein.

In regards to Claims 7, 15, and 23, the Office Action states that the invention of Weng et al. is "essentially the same as the instantly claimed invention, as such it is believed that a radiation curable adhesive is either inherently disclosed or an obvious optimization to one skilled in the art of adhesion, motivated by the desire to obtain a strong bonding of the laser mark tape to the die surface".

Applicants respectfully submit that the instantly claimed invention is very far from being essentially the same as the invention disclosed by Weng et al. Both inventions are directed to devices or methods for marking a semiconductor surface, and tape is used somehow in both. However, in Weng et al., the mark is formed in the semiconductor surface itself using an etchant. The tape is only used to pattern the mark, the mark being patterned in the tape prior to adhesion to the semiconductor surface using a high intensity energy beam. In the instantly claimed invention, a tape having radiation-curable components is applied to the semiconductor surface, after which radiation is applied, either forming a laser-markable surface or for providing a mark on the semiconductor surface. No etchant is used to form a mark in the surface of the

semiconductor surface in the instantly claimed invention. As discussed above, the tape disclosed by Weng et al. does not inherently include tape comprising radiation-curable components, and to include such components, would render the tape inoperable for the method disclosed by Weng et al. and clearly cannot be considered an obvious optimization of the device disclosed therein.

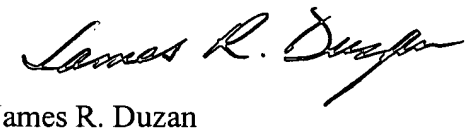
Finally, all of the claim limitations recited in Claims 1, 9, and 17 are not taught or suggested by Weng et al. Weng does not teach or suggest a tape structure comprising a multilayer adhesive, and does not teach or suggest an adhesive layer comprising radiation curable components establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed inventions of presently amended independent claims 1, 9, and 17 as well as the dependent claims therefrom.

Applicants respectfully submit that Claims 1, 7 through 9, 15 through 17, 23 and 24 are allowable in light of Weng et al., since the differences between the two disclosures are substantial and would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In summarily, Applicants submit that claims 1 through 24 are clearly allowable over the cited prior art.

Applicants request the allowance of claims 1 through 24, and the case passed for issue.

Respectfully submitted,



James R. Duzan
Registration No. 28,393
Attorney for Applicant(s)
TRASKBRITT
P.O. Box 2550
Salt Lake City, Utah 84110-2550
Telephone: 801-532-1922

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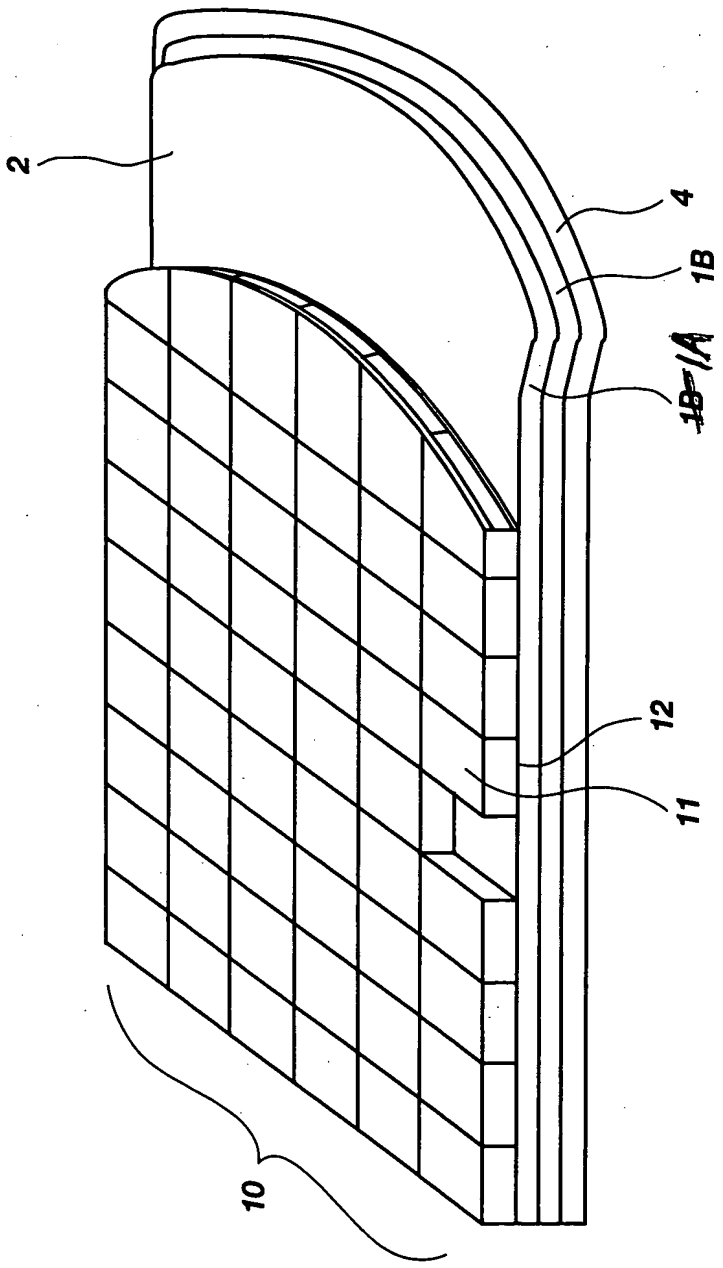

Fig. 5